

# **GAVI**

## **Data Quality Audit**

***North Korea (DPRK)***

**December 2004**  
**AUDIT YEAR 2003**

Prepared by: The LATH Consortium\*

On behalf of: GAVI (Global Alliance for Vaccines and Immunisation)  
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## Executive summary

### Objective of DQA

The DQA has been designed to assist the countries receiving GAVI support to improve the quality of their information systems for immunisation data. In addition, it calculates a measure of the accuracy of reporting.

### Method

Two senior auditors, who worked at national level of EPI before visiting four counties (districts) and six health facilities in each county, undertook the DQA. All four counties and 24 health facilities were selected randomly. The standard DQA method (GAVI, 2003) was applied, which included use of interviews, administration of questionnaires and recounting.

**Table 1. DQA Indicator Dashboard**

	<b>Audit Year 2003</b>
<b>Provisional Verification Factor (threshold 80%)</b>	<b>0.93</b>
<b>Core Indicators</b>	
DTP3 Coverage	<b>68.1 %</b>
Drop Out Rates (DTP<1 to DTP3<1)	<b>3.7%</b>
Injections and Vaccine Safety	<b>Yes</b>
DTP Vaccine Wastage Rate	<b>Not calculated</b>
Completeness of Reporting	<b>100%</b>
Vaccine Stock-Outs	<b>None recorded</b>
Action Plans for Counties	<b>Yes</b>
QSI at National Level	<b>73.5 %</b>
Average QSI for Counties	<b>72 % (48% – 87%)</b>
Average QSI for Health Units	<b>78% (54% - 92%)</b>

### Main findings

The immunisation reporting system in DPRK is well designed, was functional and information was easily retrievable at all levels. There was a high degree of completeness of reporting, documents were stored properly and staff were in general aware of the reporting procedures for immunisations, vaccines, syringes and AEFI. This contrasted with the relatively low DTP3 in under-1s coverage seen at all levels (less than 70%).

Accordingly, a high verification factor was obtained (93.0%), which is attributable to the availability of primary recording forms and reports.

However, data accuracy showed potentially serious shortcomings: monthly subtotals of DTP3 in two districts and provincial annual coverage figures showed unusual distributions, suggesting a systematic error.

The concept of targets and denominators was not clearly defined nor used and monitoring of performance was undertaken only on a monthly basis rather than annually.

Data at all levels was not thoroughly analysed and vaccine wastage and drop out rates were either not calculated or miscalculated. Drop out rate figures were negative in several HUs and vaccine wastage was found to be generally high.



## Key Recommendations:

- A further study, involving a wider selection of districts in the country is suggested, to clarify issues around data accuracy at county, provincial and national levels. Expertise in epidemiology could be sourced from UNICEF/WHO to assist with this study.
- To strengthen national capacity, additional training may be required in the areas of public health, epidemiology, and bio statistics. EPI could consider approaching UNICEF/WHO for advice and assistance.
- EPI to train on monitoring and evaluation of immunisation activities (wastage, drop-out, targets, denominators, coverage, immunisation schedule) including analysis of data at all levels.
- EPI should clearly define and disseminate the national policy in relation to denominators, targets, wastage and drop-out rate to all levels.

## 1. Introduction

The Data Quality Audit (DQA) is part of the Global Alliance of Vaccines and Immunisation (GAVI) programme. It has been designed to assist the countries receiving GAVI support in improving the quality of their information systems for immunisation data. In addition, it calculates a measure of the accuracy of reporting, the country's 'verification factor' for reported DTP3 vaccinations given to children under one year of age (DTP3 <1). In 2003, the DQA is being performed in up to 14 countries. It is hoped that participation in the DQA will assist each country in understanding the extent and details of the current issues in the immunisation programmes while providing guidance on how the country's system for recording and reporting immunisation data can be improved. It is the explicit goal of the DQA to build capacities in the participating countries.

This DQA was undertaken in the Democratic People's Republic of Korea, 30 November – 18 December 2004, by the following team:

**Table 2. Audit Team Members**

<b>Name</b>	<b>Position</b>
Dr Xavier Bosch-Capblanch	<i>Senior External Auditor</i>
Ms Valerie Remedios	<i>Senior External Auditor</i>
Dr Choe Sun Bom	<i>National Auditor</i>
Dr Kim Jong Ran	<i>National Auditor</i>
Dr Kim Son Il	<i>Interpreter</i>
Dr Han Hui Suk	<i>Interpreter</i>

### Approach and Mobilisation

To conduct the DQA the standard method previously used on other countries was applied at national, county and health unit levels consisting of (1) a set of questions concerning the functioning of the EPI programme and vaccines stock management at each level; (2) a set of questions specific for each level to estimate the quality scores and (3) a recounting of DTP3 doses administered during the audit year from the 'section doctor' ledgers present at health unit level.

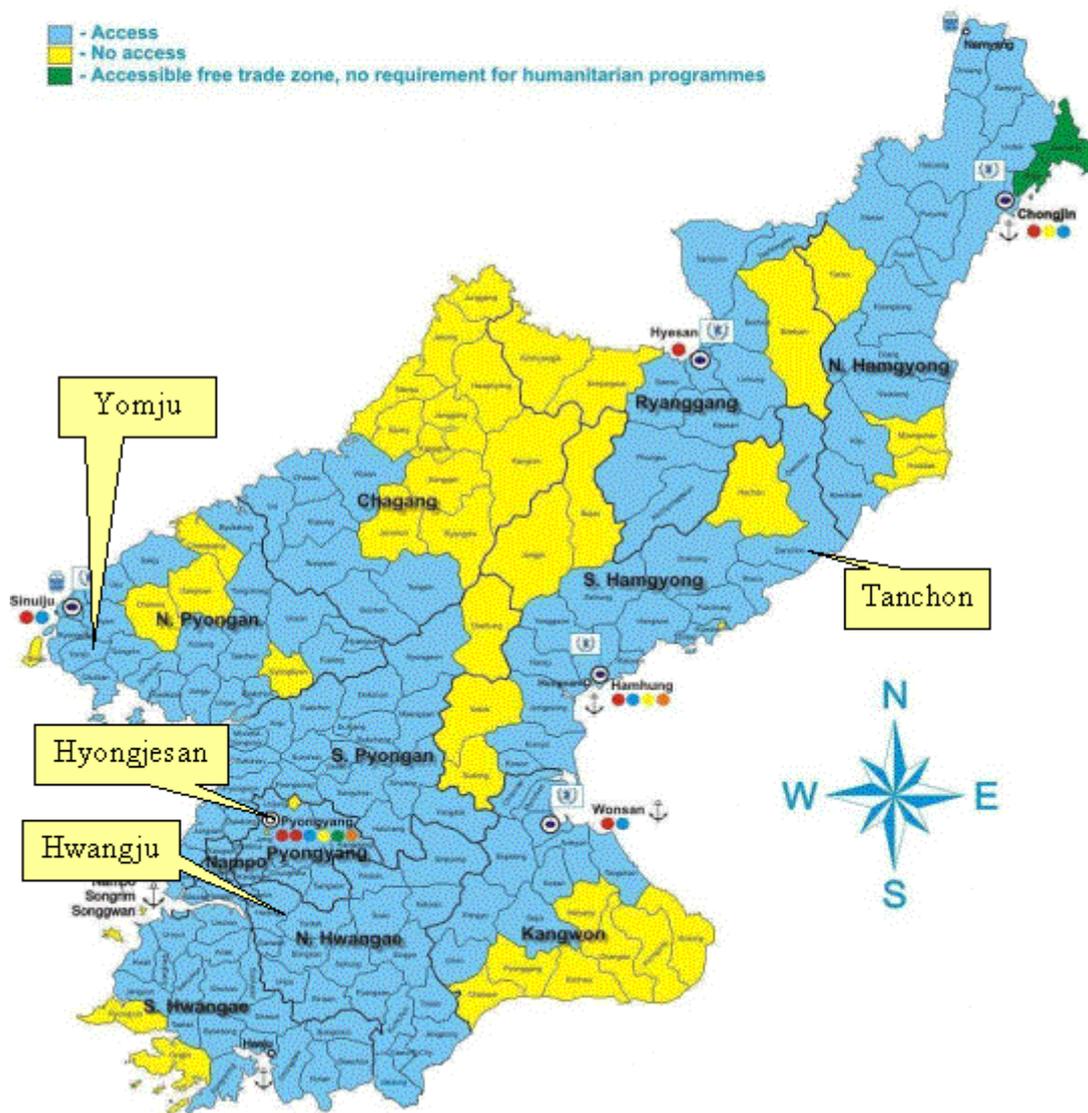
The team worked at the national level EPI office before going to county and health facility levels. Based on a random selection carried out in advance, the following four counties were visited: Hyongjesan, Yomju, Hwangju and Tanchon, and six Health Units (HU) were selected randomly in each county.

The organisation of the DQA required a revised planning schedule to fit in with the timing of the mission (the team arrived mid-week) and the long distances between one county (Tanchon) and the capital (Pyongyang). In order to undertake the DQA within the timeframe, the entire DQA team visited two counties, Hyongjesan and Hwanju and separated to visit Tanchon and Yomju counties.



Sampling in North Korea was based on district data received from the country. However, it was only once in-country and working at national level that the auditors recognised that a provincial level of reporting existed, and that district data was not sent to the national level, but aggregated at the provincial level and submitted to the national level on a quarterly basis. Districts report on a monthly basis to the provincial level. Therefore, sampling should have been based on provincial data with the selection of two provinces; however, for methodological issues, the sampling cannot be repeated once in-country. For logistical reasons it was evident that the teams could not visit the headquarters of the four provinces, therefore it was agreed that the provincial staff would meet the DQA teams at the counties with the required documentation. District reports were not available for two of the districts.

**Figure 1. Map of DPRK indicating counties visited**



A brief summary of the visits to each county is indicated below (see Figure 1 above): **Hyongjesan county** is based in Pyongyang City (Pyongyang Province) within close proximity of the centre. The team were informed, only after the selection of health units, that one of the selected health unit's could not be easily visited as the road had been closed for major works; bicycles could pass but not cars. As the health unit was some distance from the road block itself, and after some discussion on the possibility of walking to the health unit, the team decided to visit the reserve health unit.



**Yomju county** is situated in North Pyongan Province, close to the border with China. It is approximately 350 Km northeast of Pyongyang and can be reached within 4.5 hours driving. One ri was not accessible due to major road works, and was situated some 10 Km from the road. This was deemed ineligible before the selection process. Temperatures were much colder than the capital and dropped to as low as  $-7^{\circ}\text{C}$ . This resulted in very icy road conditions at the start of the day and equally poor conditions during the day when the snow had melted and the roads became extremely muddy and slushy. Access to three ri's, which were some way off the main road, became extremely hazardous.

**Hwangju county** is situated in North Hwangae Province, approximately 40 Km south of Pyongyang (around 30 minutes driving). HUs are quite close to the centre and there were no access problems.

**Tanchon county** is situated in South Hamgyong Province, northeast of Pyongyang and can be reached within 1.5 days. An overnight stop is required at Hamhung, approximately two thirds way between Tanchon and Pyongyang City. Tanchon is located in a mountainous area with narrow winding roads with steep inclines. Routes do not follow the coastal line but rather climb and descend the mountains. A significant proportion of HUs were located in the highlands while the others were down close to town. Mountainous HUs had to be excluded due to reported impossible access at this time of the year.

A meeting was held towards the end of the DQA to agree on the findings and recommendations between national and external auditors. Then, a debriefing meeting was held on 17 November 2004, chaired by the Vice Director, Ministry of Population and Health and In-Charge of International Cooperation, Dr Jong Bong Ju. Present at the meeting were the EPI staff, representatives from the donor partners, WHO, UNICEF and interpreters. A comprehensive list of persons met during the DQA including the debriefing is included in Annex 1 of this report. The members acknowledged the report and confirmed their commitment to addressing the recommendations as outlined in the recommendations section of this report.



## 2. Background

This is DPRK's first DQA. Out of 206 counties, only 168 were included in this DQA, the rest were excluded from the DQA by the national authorities for security concerns. Therefore this DQA cannot be seen as representative for the whole country.

DPRK's Expanded Programme on Immunization is established within the National Hygiene and Anti-epidemic Institute (NHA), a unit under the National Hygiene Control Committee (NHCC) which reports to the Ministry of Population and Health (MoPH). The country provides immunization against seven vaccine preventable diseases; diphtheria, pertussis, tetanus, poliomyelitis, tuberculosis, measles and hepatitis B to all children (0-11 months) in the DPRK, free of charge. Hepatitis B has recently, in September 2003, been added to the immunization schedule and is being supported through GAVI. Both UNICEF and WHO provide support to the national immunisation programme in the form of vaccines, cold chain, transport and technical assistance.

The DPRK has a very extensive network of health care institutions and providers. This comprises 'section (or household) doctors'<sup>1</sup> attached to each work team, one per 130 families; clinics, polyclinics and hospitals in each 'ri' and 'dong'<sup>2</sup>; a hospital and anti-epidemic station in each county or urban district; and hospitals in significant factories, specialised institutions and in each province and municipal city. EPI information follows a vertical upward flow from the ri (health unit), to county, to province, to the national level (National Hygiene and Anti-Epidemic Institute) and the MOPH. A separate HMIS exists for the reporting of communicable diseases, also following an upward flow to MOPH but via a completely different route.

Immunization services are offered by the government to service providers in 206 counties in the eleven provinces of DPRK.

Only children under one year of age are immunised. Individual vaccinations are recorded in the Child Health Card (CHC) and in the section doctor's own ledgers. The latter are non-standard books, however if a doctor leaves a health facility these ledgers should remain in the health facility to be taken over by the incoming incumbent. The Child Health Card's are retained at each health facility and only follow a child if re-location occurs. BCG is normally given at birth by the midwife, whether at a home delivery or in a health institution. Pregnant women are only given two doses of tetanus toxoid, TT1 and TT2 which is normally administered by the section doctor or obstetrician and recorded in the section doctors/obstetricians own book or in a TT specific ledger. Following the monthly immunisation day, information from the section doctors/obstetricians own books is transferred to the immunisation ledgers (where these are available) from which the monthly reports are compiled.

The ris and county follow a monthly reporting schedule, whilst the provinces report to national level on a quarterly basis.

<sup>1</sup> Section doctors are the main point of contact between the ri and the community. The section (or household) doctors are assigned to village work teams and urban neighbourhoods, each covering around 130 families. Field motivators, often the section doctor, are also present at ri/dong level. The Ministry of Public Health's Health Education Institute employs informers, whose role is to inform about campaigns or mobilise action. There is a high ratio of doctors to population: 568 per 100,000, compared with 162/100,000 in China and 48/100,000 in Vietnam. There is also a high number of doctors over nursing staff, in a ratio that is inverse to that found in other countries. Section doctors have a wide range of responsibilities including prophylactic and curative care. *Analysis of the situation of children and women in the DPRK, UNICEF, 2003.*

<sup>2</sup> The ris and dong are sub-district levels of governance in, respectively, rural and urban areas. The ri corresponds to the area of a cooperative or state farm.



From 2001, child health cards (CHC), ledgers for submitting monthly reports, monthly and annual immunisation recording ledgers and vaccine stock ledgers have been provided by UNICEF and were distributed to the ri, county and province levels. In general, resources are scarce and those that are available are used as optimally as possible (paper). Outside the national level where one computer was available for entering EPI data, no computers were seen.

Vaccines are distributed from the national level via the province to the county. Each province is allocated an immunization day, between 1-15<sup>th</sup> of each month when immunisation is undertaken in the ris; mobile and outreach immunisation services are not provided. Prior to the immunisation day, section doctors remind households with those infants requiring OPV, DPT, HVB or measles vaccines to attend the immunisation day. Staff from the ris collects vaccine from the county on the immunization day, AD syringes and safety boxes are collected prior to this date. AD syringes and safety boxes are considered as consumables and distributed through the Central Medical Stores who are represented at the county, provincial and national levels.



### 3. Key findings

#### 3.1. Data accuracy – verification factor

The verification factor (VF) is one of the indicators to assess data accuracy. It is the ratio between the DTP3<1 doses found in reports and DTP3<1 doses recounted in individual recording forms at health facility level. Numerator and denominator have been extrapolated to have a figure for the whole country. However, it should be kept in mind that the sampling frame for this DQA was a subpopulation of counties accessible according to the Korean authorities (168 out of 206; 81% of counties). The VF, and other data presented, cannot be seen as representative of the whole country.

Principal pre-requisites for a good verification factor are:

- Accurate aggregations whereby national reported values for DTP3<1 reflect the exact number of clients tallied.
- Complete reports available at the HUs, at the counties and at National level. The county tabulations should be up-to-date and complete
- Complete individual recording forms for the audit year (2003) available at all HUs. This requires that the records are not only completed, but well organized and easily retrievable as well.

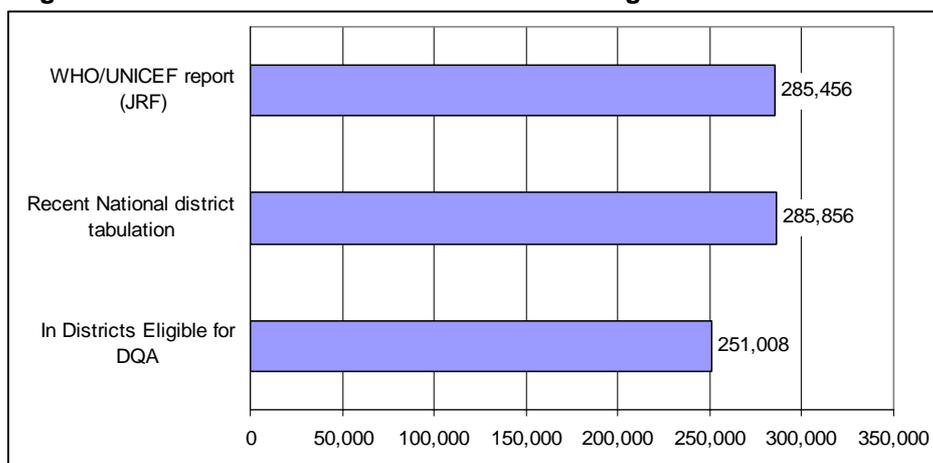
**Korea verification factor  
for DTP3 in 2003**

**0.93**  
95% CI: 78.3%-109.6%

The similarity between the partial county level reported vs. recounted ratios (100.9%, 99.8%, 79.7%, 95.3%) was translated in the relative narrow 95% confidence interval of the VF. Reasons for this high verification factor include: optimal availability of individual recording forms, 100% completeness of reporting at HU, county and national levels and high standards of record keeping at ri level.

Looking at the consistency of the total national DTP3<1 in 2003 reported from different sources, there was a slight difference between the WHO/UNICEF JRF and the provincial tabulation at national level (285,456 vs. 285,856); the difference in one single figure suggests a transcription error.

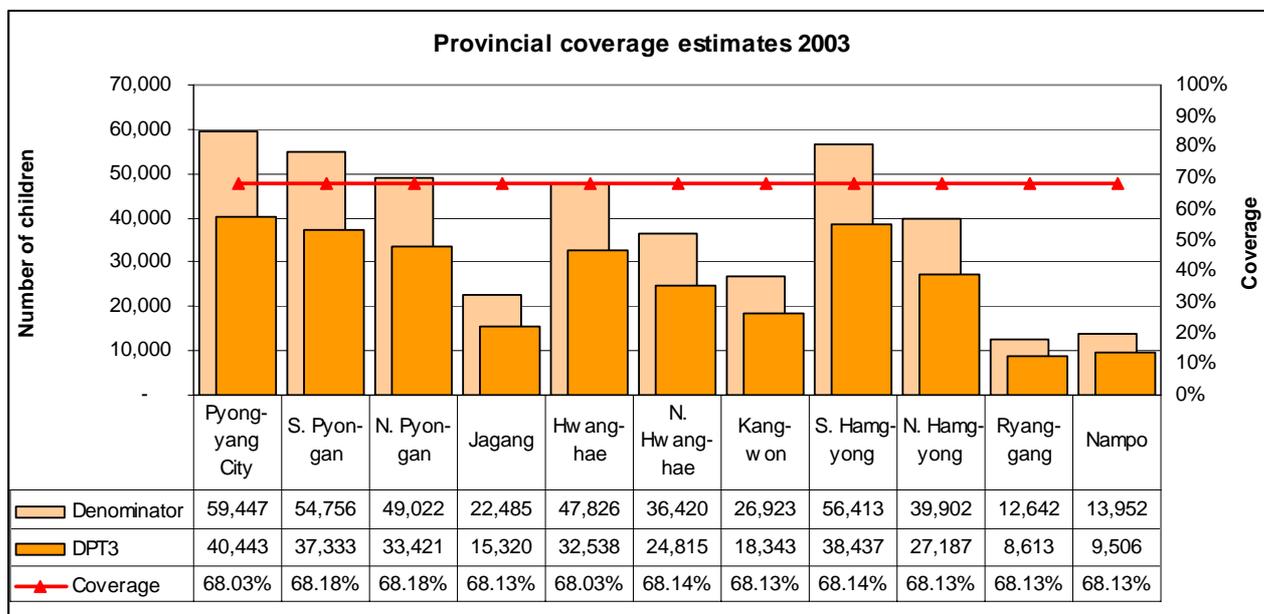
**Figure 2. DTP3 total doses to under-1s according to different sources**



Contrasting with these good results in data accuracy, the auditors observed some unusual data distributions on three occasions.

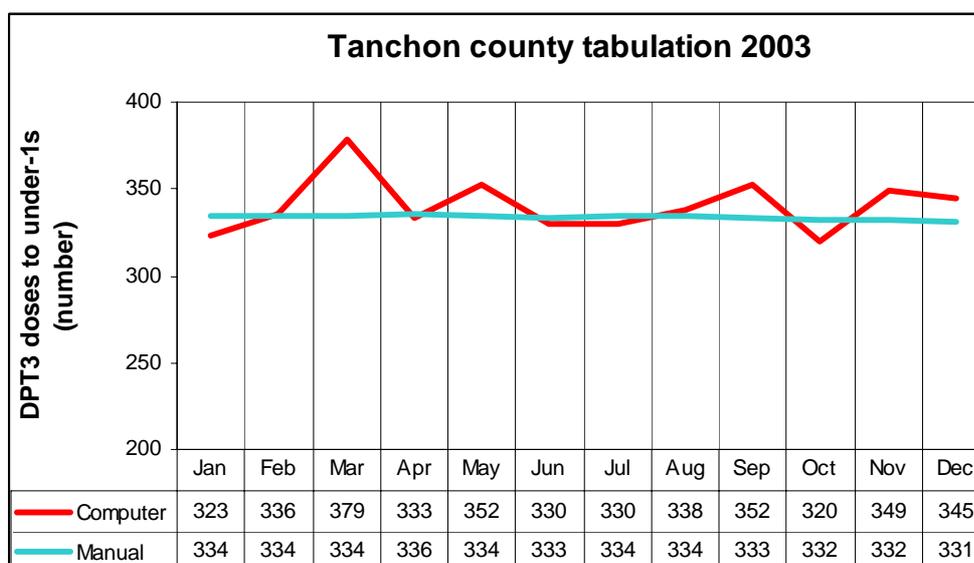
- 1) DTP3 coverage annual tabulation for 2003 found at national level: the 11 provinces of the country showed coverages between 68.03% and 68.18% (range width: 0.15%), and 5 provinces had the same value of 68.13 (see Figure 3 below).

Figure 3. Annual provincial DTP3 coverage found at national level (2003)



- 2) Tanchon county. Monthly DTP3 doses taken from the monthly tabulation (DTP3 for each HUs and month). All months had values for DTP3 between 331 and 336 and for six months the value was exactly the same, 334. However, when the tabulation was entered in the computer and monthly totals added up, the results showed much greater variation (range: 320-379). See Figure 4.

Figure 4. Monthly tabulation of DTP3 doses in the county of Tanchon



- 3) Yomju county. A similar phenomenon was observed in the county of Yomju. Monthly (for 2003) DTP3 figures for each HU were added up to obtain monthly



totals for the county (equivalent to “computer” in figure above). These totals were compared with the monthly totals sent by the county to the provincial level (“manual” in the figure above). In this case, all months in the “manual” addition had values for DTP3 between 123 and 131 and for six months the value was exactly the same, 124. The computer additions showed figures ranging from 119 up to 129, with greater variability. Moreover, 2002 monthly sub-totals were exactly the same as the 2003 ones for DTP1 <1 and DTP3 <1 (data not shown).

It is difficult to find explanations for these unusual distributions. Reasons provided included homogeneity of the population and the fact that the system is strongly centralised. However, in the cases of county data, many errors were detected in the addition of monthly subtotals, suggesting some type of systematic error. The issue in Yomju where the same figures for DTP1 and DTP3 <1 were found for 2002 and 2003 could not be explained by the district staff. The auditors conclude that the district used 2003 figures rather than admit the missing 2002 data, in order to meet the criteria of the DQA.

### 3.2. National level

The quality of the system index (QSI) is a composite indicator of the overall quality of the immunization reporting system, which is calculated for each health unit and county visited, as well as for the national level. Please note the national QSI is not a composite of the scores at all other levels, but rather a score for findings at one level only. At the national level the QSI is composed of scores in five specific areas, namely: “Recording”, “Reporting/Storage”, “Monitoring/Evaluation”, “Denominators” and “System Design”. See Figure 5 below for a detail of the scores by component.

**National level quality of the  
system index**

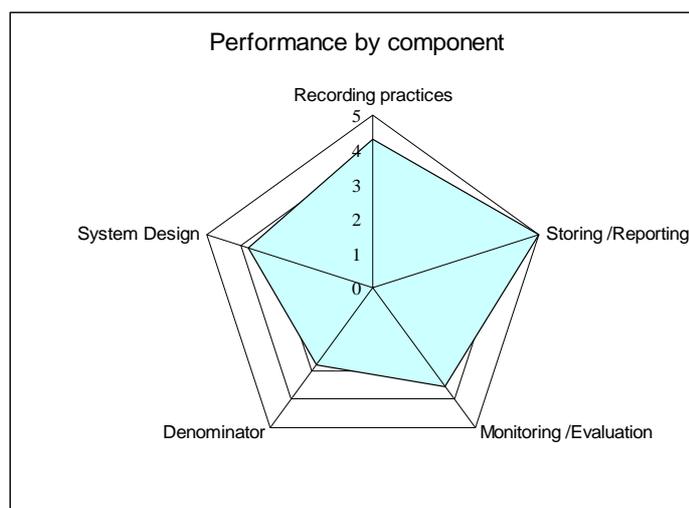
**72.0%**

#### System design

The reporting system in the DPRK is monolithic and centralised (sic). Management of information is regarded as an essential part of the health system, including the EPI programme. There seemed to be written procedures available in the EPI office and the same directives are present at the different levels of the system.

Computer files are comprehensive, well kept, the same headings were found on tabulations and information from 2002, 2003 and 2004 was readily accessible. The data clerk was familiar with files and had a good knowledge of the software used. The AEFI reporting system seemed functional and a list of cases was made available to the auditors. However, data does not allow for calculation of vaccine wastage.



**Figure 5. Quality of the system components scores at national level****Recording**

Processing of reports were up to date and vaccine stock management was optimal, with a ledger book containing up to date essential information. Not surprisingly, this component of the quality index had the second best score (4.3 over 5). This strikingly contrasted with the record keeping of the AD syringes stocks in the Central Medical Store in Pyongyang. There, no balance from the previous book was carried forward and no balance was either updated after each entry or exit of syringes. At the time of our visit it was stated that the remaining stock of AD syringes was zero. It was not possible for the auditors to check this personally.

**Storing/reporting**

Provincial reports were 100% complete for both 2002 and 2003, well classified and properly stored. All documents were very well kept and preserved.

**Monitoring and Evaluation**

The basic items assessed under “monitoring and evaluation” were present: like a map showing some provincial performance, there were up to date and recent reports and tabulations and provincial vaccine stock-outs were being monitored at national level. However, some other essential issues were not present. For example, drop-out rate and vaccine wastage were not monitored.

**Denominators**

Denominators (children under-1) were consistent with standard WHO definitions and no coverage, either at national, provincial or county level showed values above 100%. Under-1s denominators were consistency across documents (JRF, GAVI documents, tabulations). However, denominators for 2002 and 2003 were identical. This was not the case for the pregnant women denominator (420,088 for 2002 and 420,045 for 2003). Some explanations given included the fact that denominators were estimated from the number of births registered in the previous year or the effect of rounding up provincial denominators. None of those explanations seemed to really justify it. Furthermore, in two out of the four counties the number of children under-1 reported at national level was significantly lower than those reported at county level. This component (denominator) had the lowest score.

**Table 3. County denominators found at national and at county levels**

	Hyongjesan	Yomju	Hwangju	Tanchon
<b>At national level</b>	2,405	2,181	2,641	5,247
<b>At county level</b>	2,405	2,181	3,016	5,590
<b>Difference</b>	0	0	375 (+14.2%)	343 (+6.5%)



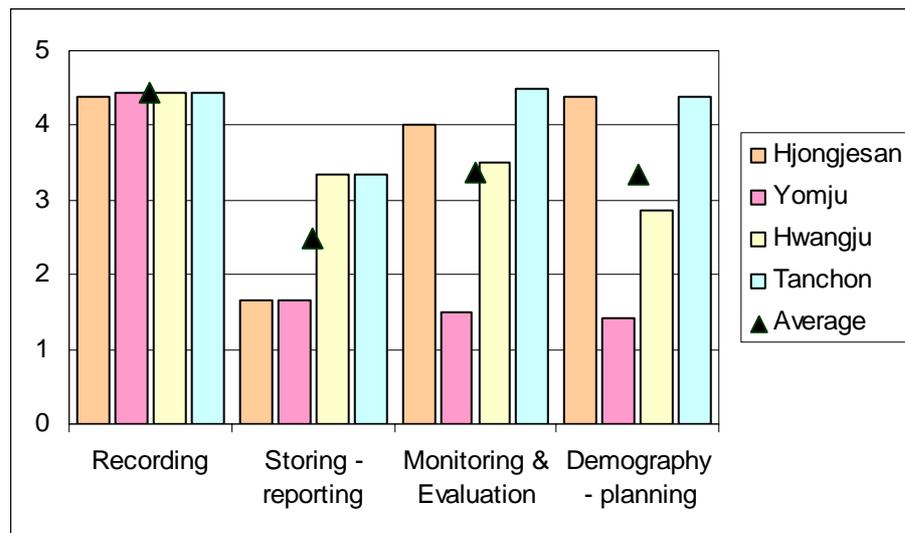
### 3.3. County level

The Quality of System Index (QSI) for the four counties was as follows:

- Hyongjesan 79.3%
- Yomju 48.3%
- Tanchon 86.7%
- Hwangju 72.4%.

The four components of the county level QSI are Recording, Storing/Reporting, Monitoring/Evaluation, and Demographics/Planning. The QSI component scores for each county are shown in Figure 6.

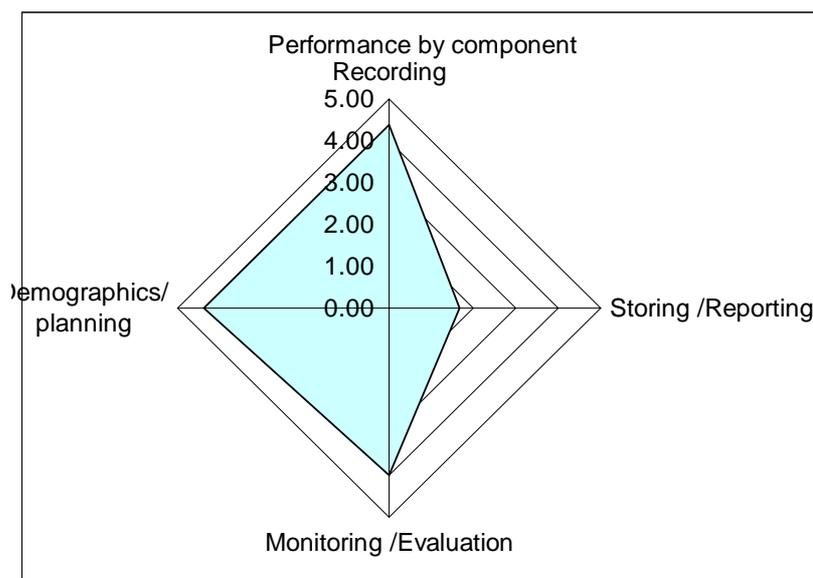
**Figure 6. Quality System Indices per Component - All Counties**



As can be seen from Figure 6, one county in particular, Yomju, performed considerably poorly when compared to the three other counties. However, despite this overall poor performance, all four counties showed a similar high level of performance in the area of 'Recording'. The weakest area for all counties appears to be 'Storing and Reporting'. This can also be seen from the Figure 7 below which presents a "spider graph" of the performance of Hyongjesan county from the DQA for the Audit Year 2003 in DPRK.



**Figure 7. Quality of the System by Components - Hyongjesan County**



### Recording

All four counties scored well in the recording component. All vaccine ledger books were up-to-date and with complete vaccine receipts. Other supplies, including syringes, are well monitored in three of the four counties. Although the health units all use the same format for reporting to the counties, the individual recording of vaccinations is not consistently the same in all health units. Some use the child register format, others record each child's name in a style particular to North Korea, and some use both styles. However, this is not a major issue and should not be changed unless any benefit can be seen from such a change.

### Demographics/Planning

Two of the four counties had targets set for the current year for child immunisations and pregnant women, however in one of these counties the target was set as the denominator for both groups. Only one county appeared to have a realistic target. County managers do not appear to take into consideration previous years' achievements in order to set realistic targets for the next year.

One county could not provide any information on denominators for children under one or for pregnant women. Of the remaining three counties, two indicated a change in the denominator value from 2002 to 2003 for children under one, contrary to the trend seen at national level. However, the same counties also indicated that different denominators were being used at county and national levels for the audit year. Only one county had the same denominator at county and national level.

Microplans and other organisational tools (including maps) were available in all four counties, some of the maps even indicate the level of performance of the health units.

### Monitoring/Evaluation

Three of the four selected counties had charts displaying updated immunization coverage for the audit year. Timelines and completeness of the HU reports was monitored in three of the four counties. Provision of feedback is conducted through regular monthly meetings with staff.

Supervision of immunization activities was found to be weak, only two counties could provide a written schedule of supervision. No monitoring of HU vaccine wastage takes place even though the information could be obtained fairly easily as none of the health units store vaccines. Drop-out is only monitored in only two of the four counties, however the method used to calculate drop-out is incorrect (as compared with the WHO standard).



### Storing/Reporting

Three of the four counties are able to store health unit reports in a well-organised manner such that they can be retrieved easily. However different procedures and regulations appear to exist in different counties on the retention and storage of previous reports at county and health unit level. In one county it was not possible to obtain any 2002 data at health unit level, as the records had been destroyed, in another county, at the year end all health unit reports are sent to the file store at the public health department in the county.

All four selected counties are able to process data and report on time, however, none of the four counties had any procedures for dealing with late reports. There appears to be good awareness and reporting of AEFI.

### Coverage and drop-out

At the national level there has been an increase in the absolute number of children (19,000) vaccinated for DTP3 from 2002 to 2003, with an increase in coverage over the same period. In contrast, three out of four counties indicate a negative change in DTP3 from 2002 to 2003 (see 4 below). The county denominator was not found in one county (Yomju), and therefore it is not possible to measure coverage, however, the remaining two counties indicate a fall in coverage from 2002 to 2003, which does not follow the national trend.

Three out of four counties indicate an increase in drop-out from 2002 to 2003, which continues to be a concern especially with the lower coverage of DTP as compared with other antigens.

**Table 4. Coverage and Drop-out Rates**

County	Year	Hyongjesan	Yomju	Tanchon	Hwangju
Coverage rate DTP3<1	2002	64.5 %	missing	73.6 %	63.4 %
	2003	68.6 %	missing	71.5 %	59.6 %
<b>Changes in DTP3&lt;1 2002-2003 (absolute figures)</b>		99	-7	-117	-192
Drop-out rate	2002	1.8 %	2.2 %	3.7 %	3.1 %
	2003	2.2 %	3.1 %	0.6 %	4.5 %

## 3.4. Health Unit Level

### Data consistency

Primary immunisation data is recorded simultaneously in two places: the doctor's book and the child health card. The child health card is a standard 8 page small booklet, one for each infant, with spaces to record the identification information of the infant and the date when each antigen is administered.

"Doctors" recorded each immunisation in their books in two different ways: (a) a new page is opened for each immunisation day and the names of children due for immunisation written in advance; then, defaulting children noted; or (b) the typical 'child register' format under the responsibility of each doctor with the appropriate columns completed for each antigen..

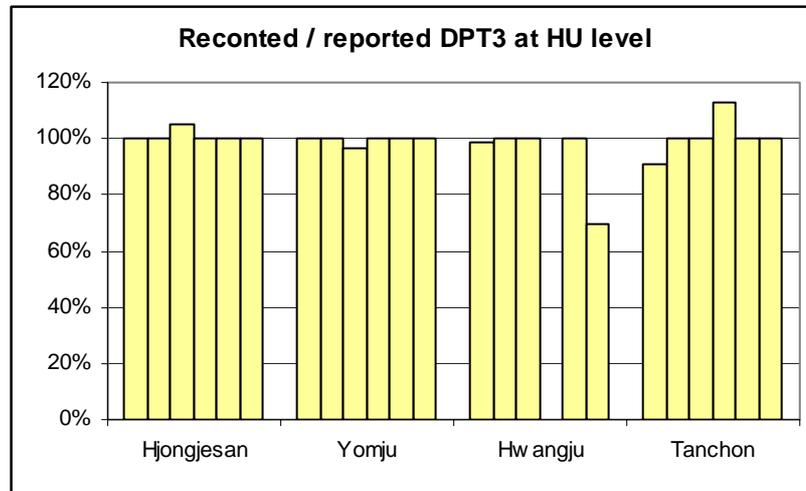
Recounting was based on the doctors' book as some child health cards could be missing due to migration; if the doctors' books were incomplete or missing, as a second option the child health cards were used.

Doctors' books were generally available and kept in good condition. 17 out of 23 HUs had DTP3 recounts which matched the monthly reported values on a month by month bases. In general, the monthly number of DTP3 doses administered was quite low and this probably facilitated the high level of congruence. The following figure also shows that it was not



possible to recount at one HU, as neither the doctors' books nor the child health cards were available on the day of the visit.

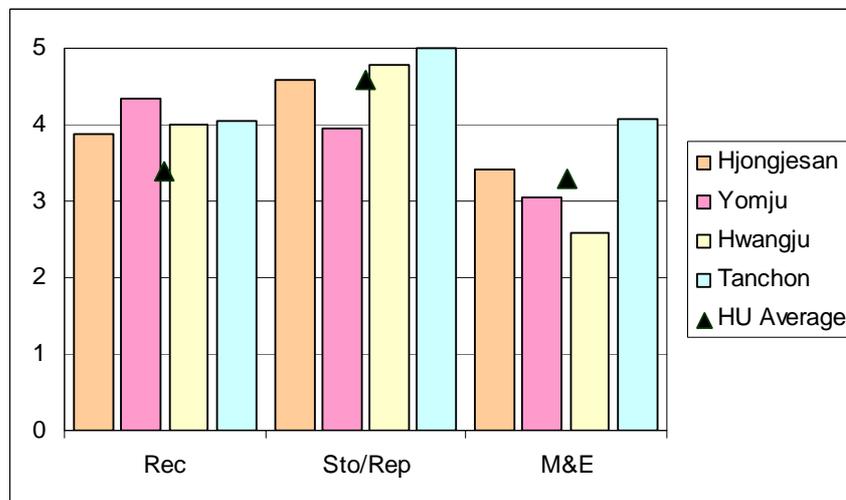
**Figure 8. Recounted divided by reported DTP3 doses at HU level**



**System index quality**

The following figure shows the average scores for each one of the three components of the quality index assessed at HU level, by county. Storing and reporting had the highest score in all counties except Yomju, while monitoring and evaluation had the lowest in the four counties.

**Figure 9. HUs average scores by quality component and county**



**Recording**

Recording practices were very good: individual immunisation forms were available, infants' vaccination histories were easily retrievable and even vaccine ledger books were complete and up to date despite the fact that none of the HUs visited stored vaccines (limited vials are received for every monthly immunisation session).

The child health card exercise however showed poor results. Of the three antigens assessed in this exercise, only 11/24 (46%) HUs answered correctly for DTP1 immunisations dates, 10/24 (42%) for DTP3 immunisations and 6/24 (25%) for measles immunisation.



### Storing and Reporting

All HUs reports for the audit year were available in all HUs and reports were neatly kept and were easily retrievable. Only in one HU the individual immunisation recording forms were not retrievable on the day of the visit, because they were under lock and the key of the padlock was not available. Reporting of AEFI seemed to be well known and functional. Not surprisingly, this component had the highest scores in 3/4 counties.

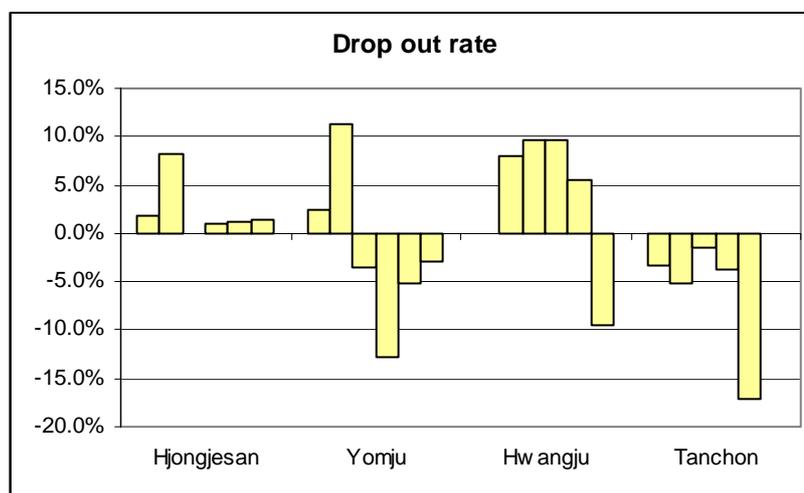
### Monitoring and Evaluation

Monitoring and evaluation was the worst component. Very good findings included the 100% registration of new births in the HU catchments areas, the existence of a map in the wall of the HUs, the monthly interaction with the communities specifically for immunisation issues and the existence of a mechanism to track defaulters. Targets were presented in almost three quarters of HUs but were generally ill-defined or erroneous. In several HUs different denominators were being used to estimate coverage of different antigens.

Interestingly, all coverage estimates were consistently assessed on a monthly bases against monthly targets. Since DTP3 figures were small in many HUs, slight variations in the absolute numbers of monthly DTP3 administrations caused major variation in monthly coverages. Therefore there was no year-wide perspective to assess performance.

Only one HU monitored vaccine wastage rate and only 5/24 monitored DTP1-3 drop out rates. The methods of calculating DTP1-3 drop out rates and vaccine wastage were repeatedly discussed. In some instances DTP1-3 drop out rates were actually based on the following:  $100 - \text{coverage rate}$ . Drop out rates estimated from the DTP1 and DTP3 figures collected at HU level showed some negative values. Several reasons were given, including the organisation of a campaign at the beginning of 2003 to catch-up defaulters of the previous year (Yomju, Tanchon) or migration of children to the area the majority of whom were due for DTP3 rather than for DTP1(!).

**Figure 10. DTP1-3 drop out rate by health facility (2003)**



Some HUs estimated vaccine wastage by taking into account the supposed amount of vaccine remaining in the needle at the top of the syringe after each immunisation. This gave some aberrant figures.

### 3.5. Other findings

#### Safety of Injections and Vaccine Safety (AEFI)

AD syringes and safety boxes are distributed via a parallel system to vaccines through the Medical Stores found at national, provincial and county levels. Based on their planned immunizations, ri's collect these items every month from the county medical store.



Recording of AD syringes at the national level was found to be poor, in contrast to three of the four counties where ledgers were well maintained. Insufficient time was available to visit one of the county medical stores. In some of the ri's, records for syringes are maintained by the pharmacy department and in others by the immunization department. Records were well maintained in 16 out of 24 ri.

Safety boxes are issued at the same time as the syringes, on a monthly basis, and in general discarded after the immunization session irrespective of the number of immunizations given.

AEFI Surveillance: at national level written procedures are available for AEFI reporting. Individual cases following an AEFI were found at national level. The routine method of reporting AEFI from ri upwards appears to be mainly by telephone, however some ri are also using the monthly reporting form although zero reporting is not implemented. According to the national guidelines, cases of AEFI should be reported by telephone and through the monthly reporting system.

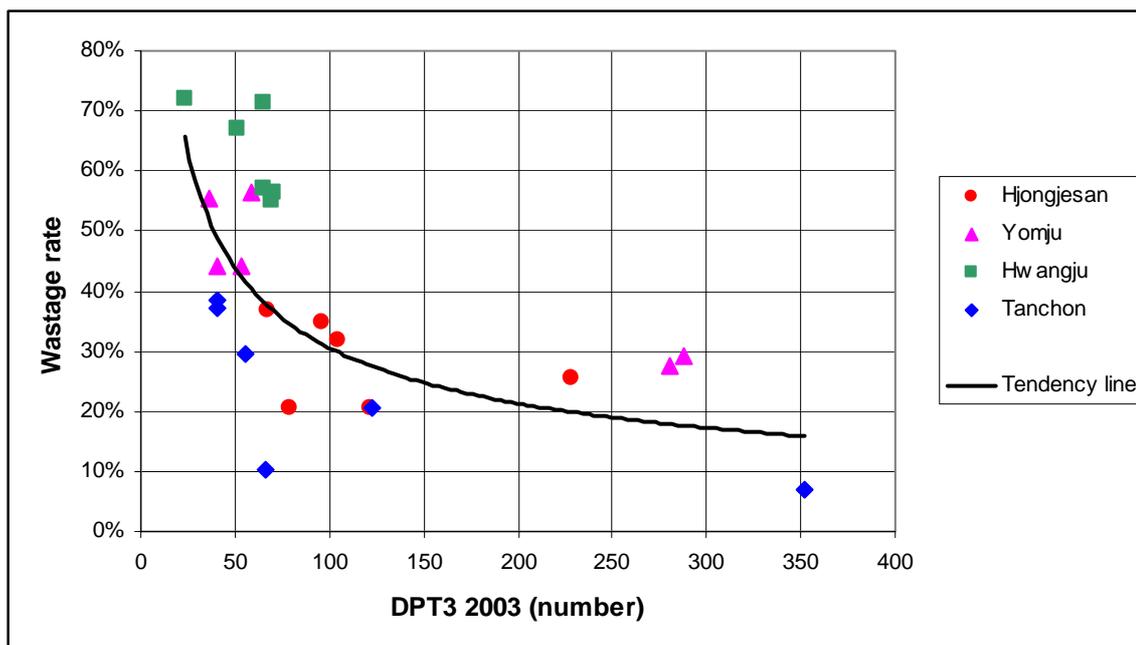
### **Wastage rate**

Wastage refers to the proportion of doses of vaccines that are in the system but that never will reach a child. Wastage may be due either to unopened vials that get expired, broken or lost (unopened or system wastage) or doses in opened vials remaining after vaccination sessions, which are no longer usable. Global wastage refers to the combination of both and is possible to calculate at the HU level only. To estimate vaccine wastage rate for a given vaccine in a given period of time we need two sets of information: the number of doses actually administered during this period of time and the total number of doses delivered, but not held in stock (unopened vials going to secondary stores in the case of unopened wastage and opened vials due for vaccination session, for global wastage).

**Unopened wastage:** wastage occurring within the vaccine stores due to losses of unopened vials can only be estimated if complete data on vaccines stock management exists. Unopened/system wastage has been 0 at National level and in each of the four counties. Global wastage: it was not possible to estimate global wastage at national level since not all the necessary data is reported from the peripheral levels. However, in the JRF the wastage was 30% taking into account the 206 counties. It was not clear how this figure was reached. Global wastage at HU level could be estimated and ranged from 6.9% - to 72.1%. The following figure examines the relationship between wastage and the absolute number of DTP3 doses in 2003 for each HU (each point represents 1 HU). The figure suggests that vaccine wastage was not arbitrary but reasonably related to the amount of doses administered in each HU. High levels of wastage could partially be attributed to the size of the vials used. In 2003, the 20 dose vial was used and has since been replaced with a 10 dose vial which should assist in reducing wastage.



Figure 11. Drop out rate and DTP3 doses in 2003 for each HU



### Completeness of Reporting

At National level the timeliness of reporting is not measured, however the completeness of reporting from the provinces was found to be 100%.

During the DQA, provincial officials were called to the respective counties and asked to carry the county reports for the audit year. Reports were only available from two provincial offices. For these counties, completeness of reporting was found to be 66.7% and 100% respectively. Those provincial officers who did not carry the reports to the county claimed that the reports had been left behind at the provincial offices, which seemed credible to the auditors. For these two counties the completeness of reporting is indicated as 0%, however this should be viewed with some caution.

At county level, reporting from the health units to the county was complete in each county, for every health unit reporting in 2003, i.e. 100% completeness. This is an excellent level of performance. Three of the four counties monitor timeliness of reporting.

## 4. Key Recommendations

### Priority Recommendations

- A further study, involving a wider selection of districts in the country is suggested, to clarify issues around data accuracy at county, provincial and national levels. Expertise in epidemiology could be sourced from UNICEF/WHO to assist with this study.
- To strengthen national capacity, additional training may be required in the areas of public health, epidemiology, and biostatistics. EPI could consider approaching UNICEF/WHO for advice and assistance.
- EPI to train on monitoring and evaluation of immunisation activities (wastage, drop-out, targets, denominators, coverage, immunisation schedule) including analysis of data at all levels.
- EPI should clearly define and disseminate the national policy in relation to denominators, targets, wastage and drop-out rate to all levels.



**At HU level**

- Encourage HU's to follow national guidelines in the calculation of monitoring and evaluation indicators.
- Seek the participation of HUs to build consensus on the need of annual (as opposed to monthly) monitoring.
- Participate in the assessment of the reasons for a lower coverage of DTP. A specific study may be necessary in coordination with WHO/UNICEF.

**At county level**

- Consider whether the implementation of uniform format for recording at HU level would benefit the reporting process.
- Ensure availability of paper/ledgers and other monitoring tools.
- Improve the use and analysis of available data on immunisation.

**At national level**

- EPI/UNICEF to assess national needs for reporting and recording tools (doctors books, immunisation and vaccine ledgers, reporting forms, etc) and ensure adequate availability at all levels.
- The national level to update technical guidelines in line with WHO standards and disseminate to all levels.
- EPI to support CMS in the recording of AD syringes
- EPI to agree on a policy for storage and retention of past immunisation information.



## 5. ANNEXES

### 5.1. Health facilities visited and key Informants (National and County levels)

#### Health Units by County

Hjongjesan	Yomju	Hwangju	Tanchon
Sopo	Tasa	Samjon	Tanchon
Harsan	Town	Wolpa	Jikjol
Ganri 2	Hakso	Ryedong	Ssangryong.
Sangdang	Naezung	Samhum	Packsan
Hyongsan	Tongsong	Sunchon	Jikjol clinic
CONAM	Samgae	Kumsok	Ryongsan

Name	Position
<b>Hjongjesan</b>	
Dr Ri Gil Won	Director, HA Station, Pyongyang City, Province
Dr Ri Myong Suk	Dr, HA Station, Pyongyang City, Province
Dr Jon Yong Ho	Director, HA Centre
Dr Kong Kun Sun	Section Chief, HA Centre
Dr Kim Kum Ju	Dr, In-Charge of Immunization HA Centre
<b>Yomju</b>	
Dr Kim Gi Hong	Director, HA Station, Province
Dr Pak In Sil	Section Chief of Immunization, Province
Dr Ri Tung Rin	Director, Health Department, County People's Committee
Dr Ri Byong Giuk	Health Officer, Health Department, County People's Committee,
Dr Kim Yong Il	Director, HA Centre
Dr Choe Tan Yong	Dr, In Charge of Immunization, HA Centre
Dr Kim In Sun	County Medical Store, Supply Officer
<b>Hwangju</b>	
Dr. Ri Dong Muk	Head of County HAE Station
Dr. No Yong Ryol	Immunisation doctor
Dr. Kim Yong Suk	Immunisation doctor in training
Dr. Kim Il Man	Chief Immunisation Department Provincial HAE Station
<b>Tanchon</b>	
Yun Gi Yong	Director of Health Department, Tanchon City People's Committee
So Bok Hyon	Head Tanchon City Anti-Epidemic-Hygienic station
Rim Myong Gil	Chief Immunisation department South Hamgyon province
Mun Un Chol	Chief Immunisation department Tanchon City Anti-Epidemic-Hygienic station
XXX	County stores



<b>National</b>	
Dr. Jong Bong Ju	Vice-director, MOPH
Dr. Kim Jong Hwan	Vice-chairman, MOPH
Dr. Choe Sun Bom	Immunization Department, NHAE
Dr. Kim Jons Ran	
Dr. Kim Jon Il	Interpreter
Dr. Han Hui Suk	Interpreter
Dr. Ye Jong Sun	Immunisation section, NAEHS
Dr. Jo Tae Hyok	Immunisation section, NAEHS
Dr. Han Kyong Ho	Director, AEHS
Dr. Kim Twk Ho	Section Chief, Immunization Section

<b>National Debriefing</b>	
Dr. Jong Bong Ju	Deputy Director, GAVI focal point, MOPH
Dr. Kim Yun Chol	Officer, National EPI, MOPH
Dr. Hong Sung Gwam	Officer, National EPI, MOPH
Dr. Han Kyong Ho	Head, Central Hygienic and Anti-Epidemic Institute
Dr. Kim Tuk Ho	Director, EPI Department, Central HAEI
Dr. Ri Kil Won	Director, Pyonyang City, HAEI
Dr. Kong Kum Sun	EPI Director, Pyonyang City HAEI
Dr. Kim Chol Ho	NPO, UNICEF, Pyonyang
Dr. Kim Kum Ran	Doctor, Central HAEI
Dr. Kim Tung Hyok	NPO, WHO, Pyonyang
Dr. Kim Jong Ran	National Auditor
Dr. Choe Sum Bom	National Auditor
Dr. Nagi Shapie	Health Officer, UNICEF, Pyonyang
Dr. Vason Pinyowiwat	Health Officer, WHO, Pyonyang
Val Remedios	External Auditor
Xavier Bosch-Capblanch	External Auditor



## 5.2. Core indicators tables

**Table 5. Core indicators at National level**

	<b>JRF</b>	<b>Reported at time of audit</b>
Counties with DTP3<1 coverage > 80%	0, 0%	0, 0%
Counties with measles<1 coverage > 90%	206, 100%	NA
Counties with drop-out rate<10%	206, 100%	206, 100%
Type of syringes	AD	AD
Counties with AD syringes	206, 100%	NA
Introduction HVB	2003; 2004 whole country	April 2004
Introduction Hib	NO	NO
Vaccine wastage DPT	30%	0%
Wastage rate HVB	NA	NA
Wastage rate Hib	NA	NA
Interruption in vaccine supply 2003		NA
Stock out at national level of any vaccine?	NO	NA
% Counties disease surveillance reports received/expected	100%	NA
% province coverage reports received/expected		100%
% Provinces coverage reports received on time		11
Number of Counties supervised at least once in 2003		NA
Number of Counties which supervised all HUs in 2003	206	NA
Number of Counties with microplans including routine immunisation	206	NA



**Table 6. Core indicators at county level**

		<b>Hjongjesan</b>	<b>Yomju</b>	<b>Hwangju</b>	<b>Tanchon</b>
County DTP3 coverage	At national	68.5%	68.6%	68.1%	76.2%
	At county	68.5%	68.2%	68.1%	76.2%
County measles coverage	At national	NA	NA	NA	NA
	At county	95.2%	92.2%	102.0%	97.5%
County Drop-out DTP1-3	At national	2.2%	2.2%	4.5%	0.6%
	At county	2.2%	2.6%	3.1%	2.5%
Syringes supplied in 2003	At national	NA	NA	NA	NA
	At county	NA	25,800	26,700	NA
Number of counties coverage reports received/sent at provincial level	At national	0/12	8/12	12/12	0/12
	At county	12/12	8/12	12/12	12/12
Number of coverage reports received on time/sent on time	At national	NA	8/12	12/12	NA
	At county	NA	NA	NA	NA
Number of HU coverage reports received/sent	At national				
	At county	192/192	276/276	396/396	660/660
Number of HU reports received/sent on time	At national				
	At county	192/192	NA	396/396	660/660
County vaccine stock out	At national	None	None	None	None
	At county	None	None	None	None
Has the county been supervised by higher level on 2003	At national	Yes	Yes	Yes	Yes
	At county	Yes	Yes	Yes	Yes
Has the county been able to supervise all HUs in 2003	At national				
	At county	Yes	No	Yes	No
Did the county have a microplan for 2003	At national				
	At county	Yes	Yes	Yes	Yes



### 5.3. Quality Index Analysis Table

**Table 7. County Quality Indices and county average (over 5)**

	<b>Recording</b>	<b>Stor/Repo</b>	<b>Monitoring</b>	<b>Demo/Pla</b>
Hjongjesan	4.4	3.3	4.0	4.4
Yomju	4.4	1.7	1.5	1.4
Hwangju	4.4	3.3	3.5	2.9
Tanchon	4.4	3.3	4.5	4.4
<b>County Average</b>	<b>4.4</b>	<b>2.9</b>	<b>3.4</b>	<b>3.3</b>

**Table 8. HU Quality indices and HU average (over 5)**

<b>Hjongjesan</b>				<b>Yomju</b>			
	<b>Record.</b>	<b>Stor/Rep.</b>	<b>Mon/Eval</b>		<b>Recording</b>	<b>Stor/Repo</b>	<b>Mon/Eval</b>
Sopo	4.3	5.0	3.3	Tasa	4.3	3.8	2.8
Harsan	4.3	5.0	2.8	Town	4.3	3.8	4.4
Ganri 2	4.0	5.0	3.9	Hakso	3.7	3.8	2.2
Sangdang	3.3	3.8	3.9	Naezung	4.3	3.8	2.2
Hyongsan	4.0	5.0	3.9	Tongsong	4.3	3.8	3.3
Chonnam	3.3	3.8	2.8	Samgae	5.0	5.0	3.3
<b>HU average</b>	<b>3.9</b>	<b>4.6</b>	<b>3.4</b>	<b>HU average</b>	<b>4.3</b>	<b>4.0</b>	<b>3.1</b>

<b>Hwangju</b>				<b>Tanchon</b>			
	<b>Record.</b>	<b>Stor/Rep.</b>	<b>Mon/Eval</b>		<b>Recording</b>	<b>Stor/Repo</b>	<b>Mon/Eval</b>
Samjon	4.0	5.0	3.3	Tanchon Polyclinic	4.3	5.0	4.4
Wolpa	4.7	5.0	1.7	Jikjol Hospital	3.7	5.0	4.4
Ryedong	3.7	3.8	1.7	Ssangryong Hospital	4.3	5.0	4.4
Samhum	2.7	5.0	1.7	Packsan Ri Clinic	4.0	5.0	3.3
Sunchon	5.0	5.0	3.9	Jikjol Ri clinic	4.0	5.0	3.9
Kumsok	4.0	5.0	3.3	Ryongsan Ri clinic	4.0	5.0	3.9
<b>HU average</b>	<b>4.0</b>	<b>4.8</b>	<b>2.6</b>	<b>HU average</b>	<b>4.1</b>	<b>5.0</b>	<b>4.1</b>

